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NOTICE.

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UNITED STATES.

A CONTRIBUTION TO THE STUDY OF TYPHOID FEVER AND ITS BACILLUS; A NEW PROCESS FOR SHOWING THE EBERTH BACILLUS IN STOOLS AND WATERS.—BY L. RÉMY, M. D., CHIEF OF THE BACTERIOLOGIC SECTION OF THE STATE ANALYTICAL LABORATORY, LIÉGE, BELGIUM.

[Translated from the "Annals of the Pasteur Institute," August, 1900, by P. A. Surg. H. D. Geddings, U. S. M. H. S.]

Typhoid fever has formed the subject of a considerable number of researches; Baumgarten mentions 380 of them from 1894 to 1898, inclusive, and since then the number has still further increased.

If we cast our eyes over the literature of this important subject, we can therein distinguish three periods:

In the first, the bacillus found by Eberth in 1880 and critically studied by Gaffky in 1883 was considered as without doubt the specific agent of typhoid fever, and all bacteriologists were unanimous in recognizing the characteristics which Gaffky had given it.

With the discovery of the B. coli communis by Escherich is ushered in the second phase. Skepticism was introduced into the minds of some as to the distinction between the bacillus of Eberth and the bacterium coli commune. From this attitude to the denial of the specificity of the typhoid bacillus was but a step, which was soon taken. As far back as 1889 Rodet and Roux thought that the bacillus of Eberth "was only a variety of the bacillus coli communis, brought about in the economy of the typhoid patient." In 1892 Malvoz defended the same thesis. Rodet continues so to defend it up to the present time.

Elsner's gelatin and the discovery of the agglutinating property of the Eberth bacillus by the specific blood serum mark the beginning of the third period. The specificity of the typhoid bacillus was recognized anew. Full accord in this belief is not yet established, even up to the present time, and the theory of the colon origin of typhoid still has its partisans. They base their opinion: (1) On the rarity of the Eberth bacillus in the stools of those stricken with enteric fever. (2) On the antagonism which exists between the Eberth bacillus and the B. coli when they exist along with each other in the same culture media. (3) On the almost constant absence of the typhoid bacillus in waters which have caused typhoid fever, while there are constantly met there the colon bacillus, and transition forms between it and the bacillus of Eberth.

It is in the hope that our contribution will serve to clear up these important questions that we set forth our experiments which have been made with a view of solving them. Our work comprises three parts: (1) Bacteriologic researches upon the dejecta in typhoid fever, and a new process for isolating the typhoid bacillus from stools. (2) Researches into the antagonism between the typhoid bacillus and the B. coli communis. (3) Researches upon the typhoid bacillus in waters, and a method for proving the existence of the Eberth bacillus in river and drinking waters.

PART I.

Researches upon the dejecta in typhoid fever—Method for isolating the typhoid bacillus from stools.

The occurrence of the typhoid bacillus in stools is of considerable importance as much from a theoretical as from a diagnostic point of view. Therefore, many bacteriologists have endeavored to show it, but few have succeeded. Gaffky, di Vestea, Pfuhl, Eisenberg, Rodet, and Roux, have sought it in vain. Pfeiffer, Seitz, Merkel, Karlinski, and Chantemesse sometimes found them, but as Sanarelli remarked, they based their conclusions on characteristics which in 1894 had little value. The author used to think that the Eberth bacillus was never isolated from typhoid stools. We admit all the more willingly that ordinary gelatin which was used, scarcely ever permits the isolation of the typhoid bacillus in the presence of the b. coli communis. We had established this fact since 1892, and in a work which we published then, in collaboration with Dr. Sugg, under the direction of Professor Van Ermengem, we expressed the wish for a gelatin which would permit the distinction upon plates between the typhoid and colon colonies.

In 1894 Nicolle met the same difficulties as we did. It is not then surprising that Wathelet, who in 1895 was contented with the defective method of ordinary gelatin plates, should have only found 10 true typhoid colonies from over 600 Eberth-like colonies which he had planted and replanted from typhoid stools.

In 1895, Elsner, thanks to his potato gelatin, recovered the typhoid bacillus from feces 15 times out of 17 cases. The search was successful on the seventh day and in the sixth week of the disease. In the same year Brieg found it 10 times in 11 cases. The bacilli were numerous at the *fastigium* of the disease and diminished with the decline of the fever.

In 1896 Chantemesse, with Elsner's gelatin, published 13 cases, where examination practiced at various periods of the disease gave positive results.

In the same year Courmont isolated the bacillus twice in 9 cases and never in other diseases. He concluded: (1) That the Elsner medium easily puts in evidence cultural differences between the Eberth bacillus and the bacillus coli occurring in our cultures. (2) These differences are not absolute, and are effaced in cultures from typhoid stools, where the colon bacillus often takes on an Eberth-like appearance.

In 1896, Pollak, using the same gelatin, isolated the Eberth bacillus in 20 cases.

Van der Velde in turn, in 1898, announced that he had only found the Eberth bacillus in 3 out of 5 cases, and the organisms were in very limited number.

If, therefore, certain bacteriologists succeeded in isolating the Eberth bacillus from stools by the Elsner method, others only obtained inconstant or negative results. *A priori* it would seem that this must be so. Elsner's gelatin is made with a decoction of potatoes; now the chemical composition of these is excessively variable, differing not only according to the variety, but also with the nature of the soil and fertilizers, and with other conditions, as the period of growth and the age of the tuber when used.

If the Elsner gelatin was very variable from the point of view of its chemical composition, it was no less so from the uncertainty which existed as its method of preparation as detailed by its author. Grimbert in 1896, made gelatin by this method "which should be feebly but still decidedly acid." He proposed, therefore, an acidity such that 10 c. c. were to be neutralized by 4 to 5 c. c. of limewater. He showed that under such conditions he obtained substantially identical results with or without the addition of the potassium iodide solution, and even by replacing the decoction of potatoes by an infusion of meat for four hours. He therefore substituted a gelatin having the following composition:

	Grammes.
Distilled water	1,000
Maltose	1
Soluble starch	2
Asparagine	2
Neutral phosphate potassa	2
Sulphate potassa	2
Sulphate magnesia	2
Ammonium bimalate	2
Magnesium carbonate	1

The liquid containing these salts is used to make a gelatin whose acidity is such that 10 c. c. are neutralized by 5 c. c. of limewater. By the use of his gelatin Grimbert obtained the typhoid bacillus 4 times in 6 cases, and the two negative results corresponded to the period of convalescence. According to the author the colonies do not appear before the third day.

For our part we much fear that the nutritive properties of this gelatin would be too feeble to permit the development of the typhoid bacillus, unless it was endowed with great vitality. This fear appears all the more reasonable because its acidity is very strong, equaling, in fact, 1–1000 of H_2SO_4.

The tardy appearance of the colonies, as well as the negative results which the author obtained during the period of convalescence, appear amply to justify this view.

The procedures of which we made use to isolate the Eberth bacillus from the stools were too imperfect, therefore, to be of easy clinical application. We must recognize, however, that the presence of the Eberth bacillus in the stools of a person whom we believe to be stricken with enteric fever is the sole one of all the signs which lead to this diagnosis—which, taken by itself, *can* lead to a positive diagnosis. Every one of the symptoms which constitute the classical symdrome of the disease may not only be wanting, but may also be met with in affections which have nothing in common with typhoid fever. Serum diagnosis, which in certain cases permits us to arrive at a rapid judgment of the nature of the disease, furnishes quite often uncertain results, whose cause is independent of the will of the observer. This fact has been amply established by Achard and Bensaude, Van de Velde and Beco, that not only do different specimens of the Eberth bacillus manifest a various-aptitude to agglutination by the same serum, but that the same specimen of the Eberth bacillus reacts in a very variable fashion to different serums. Further, Achard and Bensaude, Jez, Beco, and Du Mesnil de Rochemont have noted agglutination in nontyphoid infections, but Biberstein, Busch, Schumacher, Hesse, and Fischer mention authentic cases of typhoid fever in which the serum reaction was wanting. Finally, Ziencke, Stern, Van Ordt, Kuhnau, and Dineur report cases of positive agglutination by normal serum, and in the absence of any previous typhoid infection. It is always well to recognize the fact that serum coming from individuals, healthy, or not suffering with typhoid infections, may agglutinate the typhoid bacillus in dilutions even more feeble than that supplied by typhoid patients.

It is necessary, therefore, to dare to affirm the existence of typhoid fever based on serum diagnosis that the dilution should be 1–50 at least. Now, it is unfortunately so that there are numerous cases of typhoid where the agglutinating power only reaches this high degree late in the disease, or sometimes never attains it. Out of 14 cases cited by Beco, in 6 the serum only agglutinated in dilution of 1–10 to 1–20 from the twelfth to the twentieth day. Serum diagnosis is not, therefore, rigorously specific, since it may be observed in other infections than typhoid fever, and may be wanting in cases of authentic typhoid, or exist in such a feeble degree that we can not be permitted to draw absolute conclusions as to the presence of enteric fever.

The presence of the typhoid bacillus in the stools, then, is the sole sign, which, taken by itself, suffices for the diagnosis of typhoid fever. It is also the only one in which we can not be mistaken. In consequence the search for this organism in the stools acquires a considerable importance, and it is necessary for one to familiarize himself with it. Now, while the German bacteriologists praise Elsner's gelatin used for this purpose, French microbiologists do not unanimously share this enthusiasm, and the results which have been obtained in Belgium are very variable. This is due, as we have mentioned above, to the great variation in the chemical composition of the potato. To obviate this inconvenience we have, after painstaking and long experimentation, adopted a differential gelatin, with which we have undertaken the researches which form the subject of this memoir.

The chemical composition of this gelatin closely corresponds to that of a potato which has been sent us by Dr. Petermann. Dextrine and glucose have been omitted, and disodic phosphate substituted for dipotassic phosphate. The composition is as follows:

	Grammes.
Distilled water	1, 000
Asparagine	6
Acid, oxalic	0. 5
Acid, lactic	0. 15
Acid, citric	0. 15
Disodic phosphate	5
Magnesium sulphate	2. 50
Potassium sulphate	1. 25
Sodium chloride	2

All these salts, the magnesia sulphate excepted, are powdered in a mortar and introduced into a flask with a liter of distilled water, and 30 grammes of Witte's or Grubler's peptone. This is heated in the autoclave under pressure for ¼ hour. As soon as the flask is taken out, the contents are poured into another flask, into which has been previously placed 120 to 150 grammes of gelatin and the flask shaken to effect solution, and then made slightly alkaline with soda solution. Then cook in the autoclave at 110° C. for ¼ hour, and then acidify with a one-half normal solution of H_2SO_4, so that 10 c. c. have an acidity which is neutralized by the addition of 0.2 c. c. of one-half normal soda solution. This acidity is equivalent to 0.5 H_2SO_4 per liter.

After shaking place in a steam sterilizer for ten minutes and filter. When filtration is completed verify the acidity. For this purpose, by the use of a pipette, put 10 c. c. of the gelatin in a vessel containing 100 c. c. of exactly neutral distilled water, and add 4 to 5 drops of phenolphtalein. Let fall drop by drop, by means of a pipette graduated in one-hundredths, the one-half normal soda solution. The red color should appear as soon as 0.2 c. c. of the soda solution have been added to the 10 c. c. of gelatin. As soon as the desired acidity is obtained, add the magnesium sulphate and tube in tubes containing 10 c. c. each, and sterilize 3 times like ordinary gelatin.

At the moment of using, put into each tube of gelatin 1 c. c. of a 35 per cent solution of lactose and 0.1 c. c. of a 2.5 per cent solution of carbolic acid. When Elsner published his potato gelatin we were already using the medium whose composition we have just described, but we had only studied with it a few of the typhoid and colon bacilli in our laboratory. Its composition has elsewhere been published in 1896, after we had verified the method in which various bacilli which we were able to procure reacted toward it.

Behavior of the colon and typhoid bacilli in the differential gelatin.

A. *Colon bacillus.*—Colonies appear after two days, some deep and some superficial.

I. *Deep colonies.*—Are rounded, ovoid, sometimes fusiform, and of a yellowish-brown color.

Fine bubbles of gas, proceeding from the decomposition of the lactose, sometimes accompany them.

Superficial colonies.—Of these two varieties may be distinguished the one, circumscribed, globular, of a brownish-yellow color, sometimes with vertical prolongations which are raised above the surface of the gelatin; the other, circumscribed, with irregular outline, and opaque. In the beginning they are sometimes bluish and transparent, but rapidly take on opacity.

B. *Eberth bacillus.*—The typhoid colonies likewise show after two days, and are deep or superficial.

I. *Deep colonies.*—Of a bluish white color, smaller than the colon colonies, but perfectly distinct to the naked eye. The typhoid colonies never make gas.

II. *Circumscribed colonies.*—These are not generally well visible until the third day. In the beginning they remind one of the appearance of moulds, but later they become circumscribed and more bluish and may then sometimes reach the size of a half-franc piece. When the typhoid bacillus is endowed with great vitality, as when, for example, it comes from the spleen, its superficial colonies may more closely approach in appearance those of the colon. The deep colonies, however, preserve their typhoid characteristics.

When the colon bacillus is attenuated its deep colonies are less distinct, may lose their brownish tint and may become bluish; in such cases they are not more blue than those of the typhoid bacillus. The deep colonies are best recognized by examining them for transparency behind a black screen which comes as high as the eyes. With a little manipulation it is easy to find a position in which the colonies may be perfectly distinguished, when they may be marked with a blue pencil for transplantation.

How colon and typhoid bacilli from the stools react in the differential gelatin.

A. *Colon bacillus.*—The colon colonies generally preserve the characteristics which have been generally described for laboratory cultures.

B. *Typhoid colonies.*—The same may be said of the typhoid colonies. Some superficial colonies, however, take on a peculiar appearance, causing them to resemble fine drops of water.

We must remark, however, that colonies, whether colon or typhoid, when replanted from gelatin plates, may or may not produce atypical colonies.

Staphylococci, streptococci, and in general all organisms grow in this gelatin with the characteristics which are peculiar to them. This gelatin is not therefore elective, and various researches which we have made on the stools to eliminate the streptococci and staphylococci have failed.

We have also used without results: (1) Carbolic acid in varying proportions, (2) benzoic acid alone or combined with carbolic acid, and (3) formic acid alone or combined with carbolic or benzoic acids.

The liquefying organisms always grow badly, especially if we raise the proportion of carbolic acid to 0.5 per 1,000.

This gelatin has enabled us to look for the typhoid bacillus in the stools of typhoid patients, and as a control in the stools of those suffering with infections other than typhoid.

Search for the Eberth bacillus in typhoid stools.

Procedure.—Two-tenths cubic centimeter of fecal matter is introduced into 10 c. c. of distilled water.

Second dilution.—One loopful of the first dilution is then added to 10 c. c. of distilled water.

One, two, or three loopsful are then used to make 3 gelatin plates, and these plates are kept as far as possible at a temperature of 20–22° C. As soon as the colonies appear, that is to say, in two or three days according to circumstances, the colonies which it is desired to study further, are marked with a blue pencil. Then by the aid of a simple platinum needle, we separate the colonies by four straight strokes from the rest of the gelatin. The small cube of gelatin thus isolated is then taken up on the platinum needle and put into a tube of bouillon and placed in the incubator at a temperature of 37° C. On the next day we examine the motility of the growth, and plant 2 loopsful in a tube of lactose gelatin, previously liquefied. After thorough mixing by gentle shaking, the tube is placed in cold water to obtain rapid solidification, and then put at a temperature of 20–22° C. Under these conditions the colon bacillus gives abundant gas bubbles in twenty-four hours.

The same bouillon culture is also used for making an agglutination experiment with an artificial antityphoid serum, being agglutinated by a dilution of 1–80000 of the experimental serum.

We have often made use of the agglutination by formalin devised by Malvoz for the differentiation of typhoid and colon bacilli. These characteristics appear sufficient to us at the present time to identify the typhoid bacillus. The studies of Wernicke, Busenius, Van de Velde, Busch, Rodet, and Beco have elsewhere abundantly demonstrated this.

A résumé of cases of typhoid fever in which bacteriological analysis of the stools has been practiced.

Before publishing these observations we think it useful to give certain preliminary points in order the better to set forth the conditions under which we have experimented.

(1) The length of the prodromes being very variable, and the clinical signs of this period being only those of the first week of the disease in a less marked degree, it is difficult to definitely state the beginning of the disease. For ease of comparison, therefore, we have always counted the day of the disease as dating from the time when the patient took to bed.

(2) We have endeavored not only to prove the presence of the typhoid bacillus in the stools, but especially to count the colonies of the Eberth and the colon bacilli. By reason of the inherent difficulties of this count, it must be evident that these figures can be only approximate. To obtain mathematical accuracy it would have been necessary to replant and restudy each and every colony developed on the plates. This would have been a labor for which the results attained would not have compensated. Therefore we have been content, with a few exceptions, to replant and verify 10 colonies of each of the various varieties represented on the plates, and we have drawn conclusions as to the identity of the organisms constituting other colonies of the same variety.

(3) The agglutination by the serum of patients whose stools we have studied has been conducted from an essentially clinical standpoint. The dilution figure 1–50, which we frequently give, does not represent a maximum, but only the dilution necessary to warrant the diagnosis of typhoid fever.

Typhoid fever—Analysis of the stools.

Number.	Date of examination of stools.	Day of disease.	Day of appearance of colonies.	Total number of colonies.	Number of typhoid colonies.	Number of diffuse typhoid colonies.	Number of colon colonies.	Result of serum diagnosis.	Remarks.
	1899.		(*b*)						
1	Jan. 7	10	2	50	30	0	20	1-50	
2	Jan. 18	9	2	40	30	0	10	1-50	
3[a]	Jan. 23	14	2	62	60	0	2	1-50	
4[b]	Feb. 8	9	2	30	11	1	19	1-50	
5[c]	Feb. 9	16	2	200	30	1	170	1-30	
6[b]	Feb. 21	16	3	50	22	0	28	1-30	
7	Mar. 4	30	4	105	5	0	100	1-30	Second examination of No. 6, thirtieth day.
8	Mar. 2	17	2	(*d*)	(*d*)	(*d*)	(*d*)	(*d*)	Too many colonies on plate.
8′	Mar. 27	42	3	380	40	0	300	1-50	Second examination of No. 8.
9[b]	Mar. 7	4	2	20	2	0	18	1-50	
10[e]	Mar. 20	22	2	80	50	3	30	1-50	
11	Apr. 5	9	2	50	20	0	30	1-30	
12	......do.....	5	2	30	2	0	25	Nil.	
13	Apr. 20	11	(*f*)	(*f*)	(*f*)	(*f*)	(*f*)	(*f*)	
13′	Apr. 25	16	5	10	2	1	4	1-10	Second planting of No. 13.
14	May 31	6	2	80	8	0	72	1-40	
15	......do.....	5	2	100	5	0	95	1-50	
16	June 13	9	2	6	6	3	0	1-50	
17	June 20	16	3	100	20	0	80	1-50	
18	June 13	42	5	173	1	0	172	1-30	
19	June 19	53	4	200	0	0	200	1-30	No. 18 at fifty-eighth day of disease.
20	June 20	13	2	200	100	0	100	1-50	
21	June 23	5	3	100	4	0	96	Nil.	
22	June 28	10	2	100	5	0	95	Nil.	No. 21 at tenth day of disease.
23	Sept. 21	45	4	55	10	0	45	1-50	
24	Oct. 5	5	2	30	2	0	28	1-50	
25	Oct. 10	10	2	40	26	0	14	1-50	No. 24 at tenth day of disease.
26	Oct. 21	21	4	250	2	0	240	1-50	No. 24 at twenty-first day of disease.
27	Oct. 23	45	4	40	12	0	28	1-50	
28	Oct. 26	3	2	6	5	0	1	1-40	
29	Oct. 27	11	2	150	100	0	50	1-30	
					590	9[g]			

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[a] Note the considerable number of B. typhoid in intestine; patient died the evening of the examination.

[b] Certain colon colonies, whiter than usual, give the indol reaction, but did not ferment lactose.

[c] Comparative plates made with ordinary gelatin did not permit the isolation of the typhoid bacillus from the stools.

[d] Replanting impossible.

[e] Even up to the third week the number of typhoid bacilli in the intestine is considerable, though ordinarily at so advanced stage of the disease the number of Eberth bacilli is reduced. The patient died on the day following the examination of the stools.

[f] Ordinary dilutions give no colonies on plates.

[g] Among the 590 typhoid colonies which we have examined 5 only were superficially diffuse. This explains the failure of bacteriologists who in investigations prior to ours limited themselves to replanting only diffuse colonies as those of Eberth's bacillus.

Search for the Eberth bacillus in the stools of nontyphoid cases.

Researches have been carried out on the stools of 12 persons suffering from the following diseases: Grippe, nephritis, biliary calculus, tuberculosis, hysteria, gastric catarrh, gastro-intestinal catarrh, pneumonia, and enteritis.

In none of these patients have we found in the stools any bacilli presenting all the characters of the Gaffky bacillus, although we have sometimes replanted and studied as many as 50 colonies.

In a case of grippe we have found in 60 colonies 10 of colon bacillus suggesting typhoid by their appearance, but they did not render turbid the bouillon in which they were replanted.

In a case of gastro-intestinal catarrh and in a case of enteritis we also observe Eberth-like colonies. The organisms which composed them were motile, did not give the indol reaction, did not ferment lactose, but were not agglutinated by the experimental typhoid serum. Now, at the time of our experiments, like Wernicke and Busenius, Van de Velde, Busch, Rodet, and Beco, we attached to the property of being agglutinated by the artificial typhoid serum, a very great importance in differentiation of colon and typhoid bacilli. Therefore we eliminated these bacilli, and considered them as colons. Having thus finished the first part of our investigations, we believe it justifiable to draw the following conclusions:

(1) The differential gelatin whose chemical composition we have given is a practical and certain medium for the isolation of the typhoid bacillus in the presence of colon bacilus, by the plate method.

(2) With this gelatin we have completed the study of the stools 31 times in 23 patients at different periods of the disease. Three times there have been negative results—once on the seventeenth day of the disease (observation 8) there were too many colonies on the plates; a second time on the eleventh day (observation 13) there were no colonies; the third negative result is from a planting made between the seventh and eighth week (observation 19). For the first 2 negative experiments later examination has given positive results (observations 8′ and 13), and in the third unsuccessful experiment a previous planting (observation 18) had enabled us to isolate the typhoid bacillus in the stools of the same patient.

To recapitulate, we have isolated the typhoid bacillus from the stools in the 23 cases which we have studied, and on the following days of the disease.

One time on the third day, observation 28; one time on the fourth day, observation 9; four times on the fifth day, observation 12, 15, 21, and 24; one time on the sixth day, observation 14; four times on the ninth day, observation 2, 4, 11, and 1; three times on the tenth day, observation 1, 22, and 25; one time on the thirteenth day, observation 20; one time on the fourteenth day, observation 3; three times on the sixteenth day, observation 5, 6, and 17; one time on the twenty-first day, observation 26; one time on the twenty-second day, observation 10; one time on the thirtieth day, observation 7; two times on the forty-second day, observation 8 and 18; two times on the forty-fifth day, observation 23 and 28.

Few in the beginning (observation 24) the number of Eberth bacilli increases considerably up to the second week (observation 25) and sometimes even may constitute the entire intestinal flora (observations 3, and 16); thence it diminishes progressively (observation 26) up to the third or fourth week, and ends by disappearing gradually from the intestine, or at least we have not succeeded in finding it later by methods which had been previously successful.

(4) The intestinal flora is sometimes represented by a great number

of species and varieties (observations 5, 8, 8′, 20, and 22), while on the contrary there may be few species or varieties of the same species (observations 13′, 16, and 18).

(5) The typhoid bacilli isolated from the stools of typhoid patients belong to one and the same type; they do not give indol, do not ferment lactose, and are all agglutinated by a high dilution of the experimental serum.

(6) Formalin exploited by Malvoz for the differentiation of colon and typhoid gives variable results. Consequently we believe it will be best to abandon the process. These results confirm those obtained by Widal, Nobecourt, and Beco.

(7) The typhoid bacilli isolated from the stools in the course of the second week, as well as those isolated from the spleen at necropsy, possess a remarkable vital energy. They give beautiful colonies upon plates at the end of forty-eight hours, and rapidly render bouillon and even solutions of mineral salts turbid.

(8) On the contrary the bacilli which are found in the stools at the end of the disease have only feeble vitality. The colonies appear more slowly upon the plates (observations 7, 18, and 19) and in a series of quite similar colonies replanted upon bouillon, the ones grow abundantly, while on the contrary the others grow wretchedly or not at all.

(9) In three cases (observations 12, 21, and 22) the typhoid bacillus was found in the stools when the signs of typhoid fever, including the serum reaction, were wanting at the time of examination. Consequently the typhoid bacillus, with its attributes as we know it, is the only sign, which taken alone, can justify the clinician in asserting positively the diagnosis of typhoid.

(10) In the stools of persons stricken with infections other than typhoid we have found no genuine typhoid bacilli. We have sometimes isolated (2 cases in 12) a bacillus presenting the characters of the bacillus of Eberth, but which was not sensitive to the action of the serum antityphoid.

(11) The constant presence of the bacillus typhosus in the stools of persons stricken with typhoid fever, its absence in the intestines of patients stricken with other diseases, renders it possible to assert that the bacillus typhosus is in truth the causative agent in typhoid fever.

[Department Circular No. 134.]

Special regulations for the government of vessels plying between infected or suspected fruit ports and ports of the United States.

TREASURY DEPARTMENT,
OFFICE OF SURGEON-GENERAL U. S. M. H. S.,
Washington, D. C., August 31, 1900.

To United States consular officers, masters and owners of vessels, collectors of customs, national, State, and local quarantine officers, and others:

To permit vessels from foreign ports with perishable cargoes of fruit to enter ports of the United States without detention in accordance with